IEEE Std 100-1996

The IEEE Standard Dictionary of Electrical and Electronics Terms

Sixth Edition

Standards Coordinating Committee 10, Terms and Definitions
Jane Radatz, Chair

This standard is one of a number of information technology dictionaries being developed by standards organizations accredited by the American National Standards Institute. This dictionary was developed under the sponsorship of voluntary standards organizations, using a consensus-based process.

Introduction

Since the first edition in 1941 of the American Standard Definitions of Electrical Terms, the work now known as IEEE Std 100, The IEEE Standard Dictionary of Electrical and Electronics Terms, has evolved into the unique compendium of terms that it is today.

The current edition includes all terms defined in approved IEEE standards through December 1996. Terms are categorized by their technical subject area. They are also associated with the standards or publications in which they currently appear. In some cases, terms from withdrawn standards are included when no current source can be found. Earlier editions of IEEE Std 100 included terms from sources other than IEEE standards, such as technical journals, books, or conference proceedings. These terms have been maintained for the sake of consistency and their sources are listed with the standards in the back of the book.

The practice of defining terms varies from standard to standard. Many working groups that write standards prefer to work with existing definitions, while others choose to write their own. Thus terms may have several similar, although not identical, definitions. Definitions have been combined wherever it has been possible to do so by making only minor editorial changes. Otherwise, they have been left as written in the original standard.

Users of IEEE Std 100 occasionally comment on the surprising omission of a particular term commonly used in an electrical or electronics field. This occurs because the terms in IEEE Std 100 represent only those defined in the existing or past body of IEEE standards. To respond to this, some working groups obtain authorization to create a glossary of terms used in their field. All existing, approved standard glossaries have been incorporated into this edition of IEEE Std 100, including the most current glossaries of terms for computers and power engineering.

IEEE working groups are encouraged to refer to IEEE Std 100 when developing new or revised standards to avoid redundancy. They are also encouraged to investigate deficiencies in standard terms and create standard glossaries to alleviate them.

The sponsoring body for this document was Standards Coordinating Committee 10 on Definitions (SCC10), which consisted of the following members:

Jane Radatz, *Chair*

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or arcing tap switch to enable its contacts, and the connected taps, to be used more than once when moving from one extreme position to the other. (PE) C57.131-1995

change recording *See:* nonreturn-to-zero (change) recording.

changeover switch A switching device for changing electric circuits from one combination to another. *Note:* It is usual to qualify the term "changeover switch" by stating the purpose for which it is used, such as a series-parallel changeover switch, trolley-shoe changeover switch, etc. *See also:* multiple-unit control. (EEC/PE) [119]

change transaction A transaction that causes information in a master file to be changed. *See also:* add transaction; delete transaction; null transaction; update transaction. (C) 610.2-1987

CHANHI Abbreviation for upper channel corresponding to the half-amplitude point of a distribution. (NPS) 398-1972r

CHANLO Abbreviation for lower channel corresponding to the half-amplitude point of a distribution. (GSD) 200-1975r

Channel A control or data path established between two buses that allows information to flow from one bus to the other. The Channels specific to this standard are the CSR channels, the F2V and V2F data channels, the event channel, and the dual port memory Channel. (BA/C) 1014.1-1994

channel (1) (A) (electric communication) A single path for transmitting electric signals, usually in distinction from other parallel paths. (B) (electric communication) A band of frequencies. *Note:* The word "path" is to be interpreted in a broad sense to include separation by frequency division or time division. The term "channel" may signify either a one-way path, providing transmission in one direction only, or a two-way path, providing transmission in two directions. (EEC/PE) [119], 599-1985w

(2) (A) A path along which signals can be sent, for example, data channel, output channel. (B) The portion of a storage medium that is accessible to a given reading station. *See also:* track. (C) 162-1963w

(3) A combination of transmission media and equipment capable of receiving signals at one point and delivering related signals at another point. *See also:* information theory. (IT) 171-1958w

(4) (illuminating engineering) An enclosure containing the ballast, starter, lamp holders, and wiring for a fluorescent lamp, or a similar enclosure on which filament lamps (usually tubular) are mounted. (EEC/IE) [126]

(5) (nuclear power generating station) An arrangement of components and modules as required to generate a single protective action signal when required by a generating station condition. A channel loses its identity where single protective action signals are combined. (PE) 338-1987r, 379-1994, 603-1991

(6) (metal-nitride-oxide field-effect transistor) A surface layer of carriers connecting source and drain in an insulated-gate field-effect transistor (IGFET). This channel was formed by inversion with the help of a gate voltage, or by the presence of charges in the gate insulator, or by deliberate doping of the region. (ED) 581-1978w

(7) A band of frequencies dedicated to a certain service transmitted on the broadband medium. (C/LM) 610.7-1995, 802.3u-1995

(8) (local area networks) The channel is the transmission path from the MIC at the transmitter to the first MIC at the receiver. It may include trunk coupling units (TCUs) and connectors in addition to transmission line. (C/LM) 802.5-1989s

(9) (broadband local area networks) The bandwidth required for the transportation of a signal. The bandwidth will vary according to the information being transported. A band of frequencies dedicated to a certain service transmitted on a broadband medium. (C/LM) 802.7-1989

(10) (speech telephony) A means of one-way or two-way transmission provided by a vendor between two defined interface points. (The customer can realize a connection by con-

necting together channels from one or more vendors.) *Notes:* 1. "Provided by a vendor" means responsibility for the service and does not necessarily mean ownership of facilities. 2. Channels are provided either dedicated or switched. A dedicated channel may be a non-switched channel for the exclusive use of a customer for a contracted time period. A switched channel may be a channel established (set up and released) under customer control. 3. A channel may consist of two or more equipment items, such as transmission facilities, switching systems, etc. *See also:* connection. (COM) 823-1989w

(11) A logically independent data path between two Functions. Multiple channels can be used to reach different Functions or to represent independent instances of inter-unit communication (e.g., X.25 connections, I/O operations on different discs, datagrams to different network SAPs, etc.). Channels can either be provided by physically separate queues or by multiplexing a shared queue. (C/MM) 1212.1-1993

(12) (A) A one-way path for transmission of signals between two or more points; for example, a data channel. *See also:* circuit; line; link. (B) In data transmission, either one-way path, providing transmission in one direction only, or two-way path, providing transmission in two directions. *Synonym:* path. (C) 610.7-1995

(13) (A) A one-way path for transmission of signals between two or more points; for example, an output channel or a data channel. *Synonyms:* line; link; path. *See also:* circuit. (B) The portion of a storage medium that is accessible to a given reading or writing station, such as a track, or a band. (C) A two-way communications path between the central processor and its peripheral devices. (C) 610.10-1994

(14) The data path from any transmitting MIC to the next downstream receiving MIC. (C/LM) 8802-5-1995

(15) (overhead power lines) *See also:* frequency band. (PE/T&D) 539-1990

(16) *See also:* communication channel. (PE/SUB) 999-1992

channel-attached terminal A terminal that is connected directly to the computer by wires or cables. *Synonym:* locally-attached terminal. *Contrast:* link-attached terminal. (C) 610.10-1994

channel bank A device that multiplexes high-speed communication circuits into lower-speed communication channels; used primarily to digitize analog voice transmission. (C) 610.7-1995

channel-busy tone (telephone switching systems) A tone that indicates that a server other than a destination outlet is either busy or not accessible. (COM) 312-1977w

channel calibration The adjustment of channel output such that it responds, with acceptable range and accuracy, to known values of the parameter that the channel measures, and the performance of a functional test. (PE) 338-1987r

channel capacity (1) (data transmission) The maximum possible information rate through a channel subject to the constraints of that channel. *Note:* Channel capacity may be either per second or per symbol. (PE) 599-1985w

(2) (software) The maximum amount of information that can be transferred on a given channel per unit of time; usually measured in bits per second or in baud. *See also:* memory capacity; storage capacity. (C) 610.12-1990

channel check A qualitative assessment of performance carried out at designated intervals to determine if all elements of the channel are operating within their designated limits. (PE) 338-1987r

channel failure alarm (power-system communication) A circuit to give an alarm if a communication channel should fail. *See also:* power-line carrier. (PE) 599-1985w

channel group (data transmission) A number of channels regarded as a unit. *Note:* The term is especially used to designate part of a larger number of channels. (PE) 599-1985w

sequential circuit A logic circuit whose output values, at a given instant, depend upon its input values and internal state at that instant, and whose internal state depends upon the immediately preceding input values and the preceding internal state. *Contrast:* combinational circuit. *See also:* toggle; trigger circuit.   (C) 610.10-1994

sequential cohesion A type of cohesion in which the output of one task performed by a software module serves as input to another task performed by the module. *Contrast:* coincidental cohesion; communicational cohesion; functional cohesion; logical cohesion; procedural cohesion; temporal cohesion.   (C) 610.12-1990

sequential commutation (circuit properties) (self-commutated converters) Commutation occurs from one to the next of three or more principal switching branches arranged as a multipulse group that conduct in cyclic sequential order for usually (but not always) equal time intervals. The commutation may be direct or indirect.   (IA) 936-1987w

sequential computer A computer in which events occur in time sequence, with little or no simultaneity or overlap of events. *Contrast:* parallel computer; simultaneous computer.   (C) 610.10-1994

sequential construct *See:* serial construct.

sequential control (computers) A mode of computer operation in which instructions are executed consecutively unless specified otherwise by a jump.   (C/MIL) [2], [20], [85]

sequential data set *See:* sequential file.

sequential detection A method of automatic detection in two or more steps, normally the first using a high probability of false alarm and the last a low probability of false alarm. In radars with controllable scanning, the first detection can be used to order the scan to return to, stop at, or stay longer at the suspected target position.   (AE) 686-1990w

sequential events recording system A system that monitors bistable equipment operations and process status and records changes of state in the order of detected occurrences. This monitoring may be accomplished using a device dedicated solely to this function, or using a multifunction system such as a data acquisition computer system.   (PE) [1], [5]

sequential file A file that must be accessed using sequential access; for example, a data file on a magnetic tape. *Synonyms:* sequential data set; serial file. *Contrast:* direct data set; indexed file; partitioned data set.   (C) 610.5-1990

sequential lobing *See:* lobe switching.

sequential logic function A logic function in which there exists at least one combination of input states for which there is more than one possible resulting combination of states at the outputs. *Note:* The outputs are functions of variables in addition to the present states of the inputs, such as time, previous internal states of the element, etc.   (GSD) 91-1984r

sequential memory (sequential events recording systems) The memory that stores events in the same order in which they were received by the system. The memory capacity can be expressed as the number of events or levels. *See also:* event; level.   (PE) [1], [5]

sequential operation Pertaining to the performance of operations one after the other.   (C) [20], [85]

sequential processes (software) Processes that execute in such a manner that one must finish before the next begins. *See also:* concurrent processes; process.   (C/SE) 729-1983s

sequential processing *See:* serial processing.

sequential programming (test, measurement, and diagnostic equipment) The programming of a device by which only one arithmetical or logical operation can be executed at one time.   (MIL) [2]

sequential relay A relay that controls two or more sets of contacts in a predetermined sequence. *See also:* relay.   (EEC) [87]

sequential scanning (television) A rectilinear scanning process in which the distance from center to center of successively scanned lines is equal to the nominal line width. *See also:* television.   (EEC/PE) [119]

sequential search A search in which the items in a set are examined in order, starting from the first item in the set, until the search is successful or the end of the set is encountered. *Synonym:* linear search.   (C) 610.5-1990

sequential-stress aging A form of accelerated aging in which two or more individual stresses are applied or intensified in sequence.   (DEI) 775-1993

sequential transfer A transfer operation with multiple data transfers during the reply phase. *See also:* reply phase; transfer operation.   (C/MM) 1296-1987s

serial (1) (A) Pertaining to the time sequencing of two or more processes. (B) Pertaining to the time sequencing of two or more similar or identical processes, using the same facilities for the successive processes. (C) Pertaining to the time-sequential processing of the individual parts of a whole, such as the bits of a character, the characters of a word, etc., using the same facilities for successive parts. *See also:* serial-parallel.   (C) 162-1963w

(2) (software) Pertaining to the sequential transfer, occurrence, or processing of the individual parts of a whole, such as the bits of a character, using the same facilities for successive parts. *Contrast:* parallel. *See also:* sequential.   (C) 610.12-1990

(3) One bit following another over a single pathway. *Contrast:* parallel. *See also:* bit serial.   (C) 610.10-1994

serial access (1) (computers) Pertaining to the process of obtaining data from, or placing data into, storage when there is a sequential relation governing the access time to successive storage locations.   (C) [20], [85]

(2) (data management) *See also:* sequential access.   (C) 610.5-1990

serial access storage *See:* sequential access storage.

serial adder An adder in which addition is performed by adding, digit place after digit place, the corresponding digits of the operands. *Contrast:* parallel adder.   (C) 610.10-1994

serial addition Addition that is performed by adding the corresponding digits of the operands, one digit place at a time. *Contrast:* parallel addition.   (C) 1084-1986w

serial by bit *See:* serial transmission.

serial bus Intended as a low-cost peripheral connect or an alternate diagnostic and control path. One instantiation of a serial bus is the "Serial Bus" as specified in IEEE P1394.   (BA/C) 896.2-1991

Serial Bus (1) The name that refers to the IEEE project, P1394, which specifies a serial bus intended as a low-cost peripheral connect or an alternate diagnostic and control path.   (C/MM) 1212-1991s

(2) A bit-serial interconnect defined by IEEE P1394.   (C/MM) 1212.1-1993

(3) Refers to the IEEE P1394 project, which defines an inexpensive serial network that can be used as an alternate control or diagnostic path, as an I/O connection, or in place of a parallel bus in some systems.   (C/MM) 1596-1992, 1596.5-1993

Serial Bus management The set of protocols, services, and operating procedures that monitors and controls the various Serial Bus layers: physical, link, and transaction. See figure 34 for the relation of Serial Bus management to the Serial Bus protocol stack.   (C/MM) 1394-1995

serial clock driver A functional module that provides a periodic timing signal that synchronizes the operation of IEEE P1132 serial bus. Two backplane signal lines are reserved for use by a serial bus. However, the protocols of the serial bus are completely independent of this standard, and the inclusion of a serial bus is not a required feature of IEEE Std 1014-1987.   (BA/C) 1014-1987

serial communication (1) (supervisory control, data acquisition, and automatic control) A method of transmitting in-

the material of the conductor. A consequence of this effect is that if a current exists in a conductor between two points at different temperatures, heat will be absorbed or liberated depending on the material and on the sense of the current. 2. In a nonhomogeneous conductor, the Peltier effect and the Thomson effect cannot be separated. *See also:* thermoelectric device.   (ED) [46]

Thomson heat The thermal energy absorbed or evolved as a result of the Thomson effect. *See also:* thermoelectric device.
(ED) [46]

thrashing A state in which a computer sys-tem is expending most or all of its resources on overhead operations, such as swapping data between main and auxiliary storage, rather than on intended computing functions.   (C) 610.12-1990

thread (1) (control) A control function that provides for maintained operation of a drive at a preset reduced speed such as for setup purposes. *See also:* electric drive.   (IA) [60]
(2) (data management) In a tree, a set of link fields, one in each node, each of which points to the successor or predecessor of that node with respect to a particular traversal order.
(C) 610.5-1990
(3) A single flow of control within a process. Each thread has its own thread ID, scheduling priority and policy, *errno* value, thread-specific key/value bindings, and the required system resources to support a flow of control. Anything whose address may be determined by a thread, including but not limited to static variables, storage obtained via *malloc()*, directly addressable storage obtained through implementation-supplied functions, and automatic variables shall be accessible to all threads in the same process.   (C/PA) 9945-1-1996
(4) A single sequential flow of control within a process.
(C/PA) 1224.2-1993, 1326.2-1993, 1327.2-1993,
1328.2-1993, 14252-1996

threaded coupling (rigid steel conduit) An internally threaded steel cylinder for connecting two sections of rigid steel conduit.   (EEC) [28]

threaded tree A tree whose nodes contain link fields for one or more threads, allowing nonrecursive traversal of the tree. *See also:* doubly-threaded tree; left-threaded tree; right-threaded tree; triply-threaded tree.   (C) 610.5-1990

thread ID A unique value of type *pthread_t* that identifies each thread during its lifetime in a process.
(C/PA) 9945-1-1996

threading line (conductor stringing equipment) A lightweight flexible line, normally manila or synthetic fiber rope, used to lead a conductor through the bullwheels of a tensioner or pulling line through a bull wheel puller. *Synonyms:* bull line; threading rope.   (PE/T&D) 524-1992

threading rope *See:* threading line.

thread list An ordered set of runnable threads that all have the same ordinal value for their priority. The ordering of threads on the list is determined by a scheduling policy or policies. The set of thread lists includes all runnable threads in the system.   (C/PA) 9945-1-1996

thread of control A sequence of instructions executed by a conceptual sequential subprogram, independent of any programming language. More than one thread of control may execute concurrently, interleaved on a single processor, or on separate processors. The conceptual threads of control in an Ada application are Ada tasks. They may, but need not, correspond to the POSIX threads defined in POSIX.1c.
(C/PA) 1003.5b-1995

thread-safe A function that may be safely invoked concurrently by multiple threads. Each function defined by this standard is thread-safe unless explicitly stated otherwise. An example is any "pure" function (a function that holds a mutex locked while it is accessing static storage or objects shared among threads).   (C/PA) 9945-1-1996

thread-specific data key A process global handle of type *pthread_key_t* that is used for naming thread-specific data. Although the same key value may be used by different threads, the values bound to the key by *pthread_setspecific()*

and accessed by *pthread_getspecific()* are maintained on a per-thread basis and persist for the life of the calling thread.
(C/PA) 9945-1-1996

threat (1) A potential violation of security.
(C/LM) 802.10-1992
(2) Means by which a system may be adversely affected. Threats include both inadvertent and malicious actions.
(BA/C) 896.3-1993

three-address Pertaining to an instruction code in which each instruction has three address parts. Also called triple-address. In a typical three-address instruction the addresses specify the location of two operands and the destination of the result, and the instructions are taken from storage in a preassigned order. *See also:* two-plus-one address.   (C) 162-1963w

three-address instruction (1) A computer instruction that contains three address fields. For example, an instruction to add the contents of locations A and B, and place the results in location C. *Contrast:* four-address instruction; one-address instruction; two-address instruction; zero-address instruction.
(C) 610.12-1990
(2) An instruction containing three addresses. *Synonym:* triple-address instruction. *See also:* address format.
(C) 610.10-1994

three-bit byte *See:* triplet.

three-conductor bundle *See:* bundle.

three-dimensional graphics The presentation of data on a two-dimensional display surface so that it appears to represent a three-dimensional model, and can be viewed from any position. *Note:* Each coordinate of the model contains a triplet of information; for example, x, y, and z in the Cartesian coordinate system.   (C) 610.6-1991

three-dimensional hardware A graphical display processor that accepts three-dimensional information as input and generates an image directly rather than using a projection transformation.   (C) 610.6-1991

three-dimensional priority The property possessed by a line or surface that is in front of another line or surface from the viewer's perspective.   (C) 610.6-1991

three-dimensional radar (navigation aid terms) A radar capable of producing three-dimensional position data on a multiplicity of targets.   (AE) 172-1983w, 686-1990w

3GL *See:* high-order language.

three-input adder *See:* full adder.

three-level address *See:* n-level address.

3-of-9 bar code A variable length, bidirectional, discrete, self-checking, alpha-numeric bar code. Its basic data character set contains 43 characters: 0 to 9, A to Z, −, ., ., /, +, $, %, and space. Each character is composed of 9 elements: 5 bars and 4 spaces. Three of the nine elements are wide (binary value 1) and six are narrow (binary value 0). A common character (*) is used exclusively for both a start and stop character.
(PE) C57.12.35-1996

three-phase ac fields (electric and magnetic fields from ac power lines) Three-phase transmission lines generate a three-phase field whose space components are not in phase. The field at any point can be described by the field ellipse, that is, by the magnitude and direction of the semi-major axis and the magnitude and direction of its semi-major axis. In a three-phase field, the electric field at large distances ≥ 15 meters (m) away from the outer phases (conductors) can frequently be considered a single-phase field because the minor axis of the electric field ellipse is only a fraction (less than 10%) of the major axis when measured at a height of 1 m. Similar remarks apply for the magnetic field. *See also:* electric field strength.   (PE/T&D) 644-1979s

three-phase circuit (electric installations on shipboard) (power and distribution transformers) A combination of circuits energized by alternating electromotive forces which differ in phase by one-third of a cycle (120 degrees). In practice, the phases may vary several degrees from the specified angle.

three-phase dry-type air tors are single phase d single phase reactors a Depending on the app modified to compensate

three-phase electric loco collects propulsion pow current distribution syst

three-phase enclosure A buses and/or devices of

three-phase four-wire sy supply comprising four nected as in a three-phas connected to the neutra grounded. *See also:* alte

three-phase seven-wire sy supply from groups of nected in Y so as to obta neutral system for light grounded-neutral system neutral wire being comm nating-current distributio

three-phase three-wire sy supply comprising three of which are maintaine successively displaced i *also:* alternating-current

three-plus-one address P which one address part next instruction to be in

three-plus-one address in contains four address fie of the instruction to be struction to add the cont results in location C, the D. *Contrast:* four-plus-o address instruction; two-

three-position relay A rel tinct positions.

three-state A type of bus at all.

three-state circuit A dig states: logical one (false pedance output to isolate

three-state indication *See.*

3-state pin A component either active or inactive

three-terminal capacitor trodes) insulated from third conductor that cons is provided with properl shielded leads, the direct trodes is independent of (Specialized usage.)

three-tone slope A measur and 2804 Hz relative to tone slope is specified fo

three-wire control A cont tary-contact pilot device vide undervoltage protec protection.

three-wire system (direct current) A system of el